



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/524,227	03/13/2000	Irene T. Spitsberg	13DV13004	6813
30952	7590	05/26/2005		
HARTMAN AND HARTMAN, P.C. 552 EAST 700 NORTH VAIPARAISO, IN 46383				
			EXAMINER MARKHAM, WESLEY D	
			ART UNIT	PAPER NUMBER
			1762	

DATE MAILED: 05/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/524,227

Applicant(s)

SPITSBERG, IRENE T.

Examiner

Wesley D. Markham

Art Unit

1762

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 February 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 March 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Acknowledgement is made of the amendment filed by the applicant on 2/22/2005, in which Claims 1 and 9 were amended. **Claims 1 – 20** remain pending in U.S.

Application Serial No. 09/524,227, and an Office action on the merits follows.

Drawings

2. The formal drawings (4 sheets, 9 total figures) filed on 3/13/2000 are approved by the examiner.

Specification

3. The examiner notes that the word "of" still appears to be misspelled "f" on page 7, line 23 of the specification. However, the applicant states that they were unable to find the aforementioned misspelling and that the error may have occurred during transcription of the application from the applicant to the USPTO. As such, an examiner's amendment can be used to correct the typographical error at an appropriate time, as suggested by the applicant.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

Art Unit: 1762

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. **Claims 1, 4 – 8, and 10** are rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art (AAPA) in view of Nakamura et al. (JP 01-180959 A) for the reasons set forth in paragraphs 6 – 7 of the previous Office action (i.e., the non-final Office action mailed on 10/22/2004). Please note that amended Claim 1 simply incorporates the limitations of previous Claim 9, which was fully discussed in paragraph 7 of the previous Office action.
6. **Claims 2, 11, and 13 – 18, and 20** are rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art (AAPA) in view of Nakamura et al. (JP 01-180959 A), and in further view of Loersch et al. (USPN 4,514,469) for the reasons set forth in paragraphs 9 – 11 of the previous Office action.
7. **Claim 3** is rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art (AAPA) in view of Nakamura et al. (JP 01-180959 A), and in further view of Duhl et al. (USPN 4,512,817) for the reasons set forth in paragraph 13 of the previous Office action.
8. **Claim 12** is rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art (AAPA) in view of Nakamura et al. (JP 01-180959 A), in further view of Loersch et al. (USPN 4,514,469), and in further view of Duhl et al.

Art Unit: 1762

(USPN 4,512,817) for the reasons set forth in paragraph 15 of the previous Office action.

9. **Claim 19** is rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art (AAPA) in view of Nakamura et al. (JP 01-180959 A), in further view of Loersch et al. (USPN 4,514,469), and in further view of Duderstadt et al. (USPN 5,238,752) for the reasons set forth in paragraph 17 of the previous Office action.

10. Amended **Claim 9** is rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art (AAPA) in view of Nakamura et al. (JP 01-180959 A), in further view of Hayess et al. (USPN 6,210,744 B1).

11. The combination of the AAPA and Nakamura et al. teaches all the limitations of Claim 9 as set forth in paragraph 6 of the previous Office action, except for a method wherein recrystallization of at least the surface region of the aluminide bond coat occurs during deposition of the TBC on the surface of the bond coat. However, the AAPA does generally teach depositing a ceramic layer on the surface of the aluminide bond coat to form a thermal barrier coating (See "PRIOR ART" Figures 2 – 5, page 8, lines 8 – 34, page 9, lines 1 – 35, and page 10, lines 1 – 24, of the applicant's specification, which depict and describe a TBC system of a type known in the art), and Nakamura et al. reasonably suggests recrystallizing the diffusion aluminide coating by heating the coating to a temperature at or above the

recrystallization temperature (Abstract) and gives a specific example of heating to a temperature of 900° C (see paragraph 13 of the previous Office action). Hayess et al. teaches that the temperature of a bond-coated component during the deposition of a ceramic TBC is preferably maintained between 900° C and 1150° C (i.e., a temperature above the recrystallization temperature of a diffusion aluminide bond coat – see Nakamura et al.) in order to provide good adhesion of the TBC to the bond coating and obtain a TBC having a desirable columnar microstructure (Col.3, lines 1 – 8 and 59 – 60, Col.4, line 65 – Col.5, line 12). Therefore, it would have been obvious to one of ordinary skill in the art to maintain the peened, bond-coated component of the combination of the AAPA and Nakamura et al. at a temperature between 900° C and 1150° C during the deposition of the TBC in order to reap the benefits associated with this deposition temperature (i.e., good adhesion of the TBC to the bond coating and a TBC having a desirable columnar microstructure). As this temperature is above the recrystallization temperature of the aluminide coating, it is the examiner's position that recrystallization of the peened bond coat would have inherently occurred to some extent during the deposition of the TBC. Alternatively, it would have been obvious to one of ordinary skill in the art to utilize the high temperature of the TBC deposition process to recrystallize the diffusion aluminide bond coating of the combination of the AAPA and Nakamura et al. with the reasonable expectation of (1) success, as such a temperature is above the recrystallization temperature of the coating, and (2) obtaining the benefits of recrystallizing the bond coat during TBC deposition, such as minimizing the total

number of required process steps (e.g., because a separate heating / recrystallization step would not be necessary when the bond coat recrystallization occurs during TBC deposition) and maximizing throughput.

Response to Arguments

12. Applicant's arguments filed on 2/22/2005 have been fully considered but they are not persuasive: The applicant's arguments are based on the 37 CFR 1.132 declaration of Ms. Irene Spitsberg, the sole inventor of the subject matter claimed in the instant application. As such, the arguments will be addressed in the context of the declaration.
13. The declaration under 37 CFR 1.132 filed on 2/22/2005 is insufficient to overcome the 35 U.S.C. 103(a) rejection of Claims 1 – 20 based upon the prior art and set forth above for the following reasons.
14. The declaration states that Ms. Spitsberg is not aware of anything in the technical literature that supports Nakamura's theory that diffusion coatings fail as a result of cracks propagating through the coating (page 3), as Ms. Spitsberg and others in the technical community have observed failure through different mechanisms.
15. In response, this argument is not convincing. Please note that a reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill in the art (MPEP 2123). In this case, Nakamura teaches that, "even if cracking occurs, its speed of propagation is retarded because of small grain size, and, as a result, the effect of increasing resistance to the peeling off of the coating layer can

be obtained" (Abstract). This is a teaching that indicates that diffusion coatings can fail (peel) due to crack propagation through the coating, and one of ordinary skill in the art would have taken it as such. The fact that Ms. Spitsberg is not aware of other technical literature supporting this theory and that others have observed different failure mechanisms of a diffusion aluminide coating is not sufficient evidence to overcome the explicit teaching of Nakamura.

16. Additionally, the declaration states that Ms. Spitsberg believes (1) that the technical community does not agree with the theory that peeling of a diffusion coating is the result of crack propagation through the coating (page 4), (2) it is generally accepted that spallation of a TBC system employing a diffusion coating as a bond coat is related to cracking of the alumina scale that forms on the surface of the bond coat (above the bond coat, not within the bond coat) (pages 4 – 5), (3) at no point during a TBC spallation process does cracking of the bond coat occur (page 5), (4) the failure mechanism that leads to TBC spallation does not relate in any way to thermal fatigue cracking of a diffusion coating, which is the problem addressed by Nakamura (page 5), (5) there is ample evidence to argue that the problems described by Nakamura as being associated with diffusion aluminide coatings do not exist in the AAPA's TBC system (page 5), (6) because bond coat cracking does not play a role in the spallation of TBC deposited on a diffusion bond coat, those in the art would not consider Nakamura's peening and recrystallization process to be relevant or useful (page 6), (7) Nakamura's shot peening process would not provide any motivation to peen a diffusion bond coat to inhibit TBC spallation (page 7), (8)

peening was applied for a specific and unique purpose different from Nakamura's purpose (page 8), and (9) thermal fatigue resistance of a diffusion coating is a property that would not appear to have any effect on TBC performance, and as such, Nakamura would not have provided motivation to peen the bond coat to improve TBC performance (page 10).

17. Regarding issues (1), (4), (6), (7), and (9), these statements amount to the opinions of Ms. Spitsberg. Although opinion evidence in a declaration is entitled to some weight (MPEP 716.01(c)), the opinion evidence of Ms. Spitsberg must be viewed in light of the fact that she is the sole inventor of the instant application and thus has a material interest in the instant application.
18. Regarding issue (8), please note that the fact that applicant has recognized another advantage (e.g., that recrystallizing a diffusion aluminide bond coat reduces failure due to cracks within an alumina scale that grows on the bond coat and/or at the interface between the bond coat and alumina scale) which would flow naturally from following the suggestion of the prior art (i.e., recrystallizing a diffusion aluminide coating to reduce failure due to cracks within the aluminide coating itself, as taught by Nakamura) cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter., 1985).
19. Regarding issues (1) – (9), the thrust of the declaration of Ms. Spitsberg is that she, as well as the technical community as a whole, does not recognize that cracking of the aluminide bond coat is a problem in the art of TBCs because spallation of a TBC

occurs by a mechanism that has nothing to do with cracking of the bond coat (i.e., cracking of the alumina scale above the bond coat). As a result, there would have been no motivation to perform the peening / recrystallization process of Nakamura in the context of a diffusion aluminide bond coat of a TBC system. In response, the examiner disagrees with the conclusion drawn by the declaration. Even assuming that the facts and opinions set forth in the declaration amount to a showing that cracking in a bond coat below a TBC would not cause peeling or spallation of the TBC system because spallation occurs by a mechanism that has nothing to do with bond coat cracking, one of ordinary skill in the art would still have been motivated to perform the peening / recrystallization process of Nakamura on the diffusion aluminide bond coat of the AAPA. For example, Nakamura teaches that the peening / recrystallization process leads to high thermal fatigue resistance, good corrosion resistance, and reduced cracking / crack propagation in general (Abstract). These bond coat properties would have been desired by one of ordinary skill in the art, regardless of whether or not the bond coat is the ultimate cause of TBC failure / spallation (see, for example, Nelson et al. (USPN 5,413,871) (Col.4, lines 39 – 63), which is cited to show that cracks in a bond coat are a problem in the context of TBCs because even a small crack could serve as an entry point for undesirable contaminants passing through the TBC). In performing the peening / recrystallization process of Nakamura on the diffusion aluminide bond coat of the AAPA, one of ordinary skill in the art would have reasonably been expected to balance the advantages of peening / recrystallizing the bond coat against the possible

Art Unit: 1762

advantages of grit blasting (roughening) the bond coat (as disclosed by the AAPA) that may not be obtained.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wesley D. Markham whose telephone number is (571) 272-1422. The examiner can normally be reached on Monday - Friday, 8:00 AM to 4:30 PM.

Art Unit: 1762

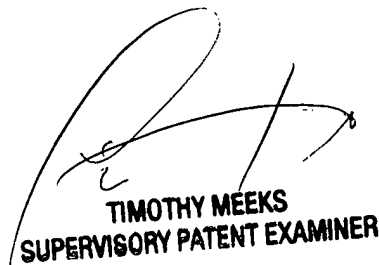
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tim Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



WDM

Wesley D Markham
Examiner
Art Unit 1762



TIMOTHY MEEKS
SUPERVISORY PATENT EXAMINER